

MC plans in Top group

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Basic Strategy

- Next round of Top group analysis is to update summer results with 200pb^{-1} (by Sep. 03) using same analysis code [4.9.1 MC] for next two months.
(validation for new data, and updated results)
- Then, move to publication level's work using optimized code and suitable MC dataset (5.3.x MC)



- More complementary samples for 4.9.1 MC sets which require a better understanding in top signal and bcks (for next one month) : focus of today's talk!!!
- Then, move to 5.3.x MC samples.
 - ✓ Basically, same principle for summer top MC production will be used with additional knowledge we learned from summer03 analysis,
 - ✓ Following order: top signal, bcks, systematic samples (sensitive to calorimeter/tracking improvements)

Strategy for summer03 MC

- Signal MC : 10-100 fb⁻¹ MC sample
(min. 1k evts after final cuts)
- Background MC:
 - a. At least 1k evts for each process after final cuts for tuning cuts and shape studies.
 - b. Same process in different lepton channel can be reduced.
- Use filters at HEPG level if rejection factor >5-10, unless it introduces any bias and effect to other physics groups (lepton filter from W/Z decay, e/mu filter from tau decay).
- Make use of various studies at generator level before cdfsim (like PDF, Q2 scale uncertainties)
- Make a coherent efforts with another MC groups to reduce any double efforts. (like W/Z samples)
- Take an advantage of another computing resources.

Top signal MC

RED: future 4.9.1 requests

❖ Top Pair production

- Central PYTHIA/HERWIG: fine
- Systematic for ISR/FSR/underlying : fine
- Systematic for different W helicity: fine (HERWIG/MadGraph)
- Further systematic samples:
 - Systematic for PDFs: only 50K for CTEQ6 series ($\delta M_{\text{top}} = 2$ GeV due to poor statistics), at least 500K.
 - High-statistics M_{top} sets for D0 style dynamic likelihood top mass fitting (25k \rightarrow 200k for 13 sets)
 - Blind MC with 5 different M_{top} sets (each 100K) : to test many developed Top mass fitting algorithm
 - MC@NLO (400k): only 5% gg contribution in PYTHIA/HERWIG (though it should be 15%)
 - Tuned Z-pt PYTHIA (200k)

❖ Single Top production

W/Z MC

❖ ALPGEN W/Z+Njet

- W + N Partons (0,1,2,3,4) for each lepton: 0.3M evts
- Wbbbar/ccbar + N (0,1,2) for each lepton: 0.3 M
- Wc + N (0,1,2,3) for each lepton: 0.3M
- Z+N(0,1,2) for each lepton: 0.3M
- Zbbbar/ccbar+N(0,1) for each lepton: 0.3 M
- Systematic for diff. Q2 scales: W(e)+3p/Z(e)+1p
- Further systematic samples:
 - W(e)+N(0,1,2,3,4) with diff. Q2 scales: 0.3M for each.
 - Steve Mrenna's W(e)+N(0,1,2,3,4) MadGraph samples. (ALPGEN W/Z+Njets samples suffer from double counting in ME+PS matching scheme): 2.6 M
 - Few complementary MadGraph samples for Wbbbar+N.
 - More DY+2P samples? (under investigation)

❖ PYTHIA/HERWIG W/Z from EWK

Diboson MC

- ❖ ALPGEN W/Z+Njet (favorite sample)
 - WW+ N(0,1,2) with one lepton: 1M evts for each jet
 - WZ+0P with one lepton: 0.3M evts
 - ZZ+0p with one lepton : 0.3M
 - Further systematic samples:
 - WZ/ZZ+N(0,1): 1M for each jet using updated ALPGEN (full spin correlations in WZ/ZZ are not included in boson decay)
 - Complementary MadGraph WW+N(0,1,2) with one lepton
 - ✓ Width of W or Z in ALPGEN is zero). a
 - ✓ Spin of tau from W/Z decay in ALPGEN was not transferred to tau decay.
- ❖ PYTHIA
 - PYTHIA WW with dilepton (0.8M)
 - PYTHIA WZ with dilepton (0.1M)
 - PYTHIA inclusive WW (0.5M) for diboson group.

Misc samples

- ❖ QCD heavy flavor samples.
 - QCD heavy flavor jets with single lepton filter: 0.3M with Jet $E_{\text{min}}=25$
 - High-statistic samples with diff Jet E_{min} are required for b-tagging study (tcl file is underway).
- ❖ Validation sample for top signal (as offline version keep increased)
 - Top signal MC sample for offline 5.2: 400K
Even though we have basic validation samples for e,mu,jet and tracking as new sim/prod. comes, it is possible that still we see a surprise in ttbar signal (multi-objects events). A good to have 5.2 sample before we produce 5.3.x ttbar MC version.

Things to be 5.3.x MC set

- Better jet energy scale & resolution (E/P, non-linearity)
- Momentum scale, MET (energy leakage)
- Extra material for electron
- Trigger simulation
- Run by run beam-line simulation
- Multiple interaction